FOREST PEST MANAGEMENT
Pacific Southwest Region

Report No. 81-31

3430 Evaluation
November 19, 1981

DERMEA CANKER IN A DOUGLAS-FIR PLANTATION ON THE HAPPY CAMP RANGER DISTRICT, KLAMATH NATIONAL FOREST

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ABSTRACT

A 15-year old plantation of Douglas-fir was suffering extensive limb and tip dieback caused by Dermea pseudotsugae. The limb and tip dieback appeared to have reached its peak, but the progress of the disease will be followed in 1982 to see if the disease is at the end of its cycle (2-3 years). Alternatives include: 1) No change in present management; 2) Promote vigorous growth; 3) Plant resistant species; and 4) New plantations should not have major components of Douglas-fir on poor sites.

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INTRODUCTION

On August 26, 1981, James Allison, pathologist, Forest Pest Management Staff, carried out an evaluation on a 19-acre Douglas-fir plantation 241-13 ("Coon Creek 4") where a limb and tip dieback was killing young Douglas-fir trees. He was accompanied by David Hartman from the Happy Camp Ranger District.

OBSERVATIONS

The plantation, at an elevation of 2600 feet, is located within an area that has Douglas-fir, ponderosa pine, and sugar pine. The plantation was planted with Douglas-fir and ponderosa pine in 1965 and thinned in 1975. Dermea pseudotsugae was first identified in the U.S. in this plantation. The site, composed of serpentine and granitic, soil, is rocky and poor, about site class 4 or 5. The Douglas-fir appeared to be taller and more vigorous on the edges than in the center of the plantation.

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District personnel had previously examined the plantations and found that about 10% of trees within the plantation were dead from previous Dermea pseudotsugae infections.

The disease appears to have reduced the stocking level in portions of the plantation to less than 50%, thus creating understocked areas with heavy brush.

The disease first appeared on the limbs, causing the infected ones to "flag" and die. This "flagging", or sudden death of a limb with the needles turning first yellow and then red, was observed in late May and was very noticeable by mid-June. A canker was usually found at the base of the dead limb. Trunk cankers originated from infected limbs and had a characteristic reddish margin that disappeared when the tree died.

An examination of the limb and tip dieback and the associated cankers indicated that the cause of the disease was D. pseudotsugae. Field identification was confirmed by isolation of the fungus from cankered tissues.

DERMEA CANKER OF DOUGLAS-FIR

Dermea pseudotsugae, causal agent of the canker on Douglas-fir, was first found in the U.S. in 1970. It was causing limb mortality and top kill in Douglas-fir plantations on the Klamath National Forest near Happy Camp, California. In 1971, D. pseudotsugae was found killing trees young Douglas-fir in natural stands in Trinity, Humboldt, Siskiyou, and Mendocino Counties. By 1976, D. pseudotsugae was reported from private, State, and Federal forest lands in DelNorte, Humboldt, and Siskiyou Counties. It is now widespread in natural stands of Douglas-fir affecting trees that range in size from saplings to young sawtimber. Initially this disease was thought to be a problem only in plantations.

Dermea pseudotsugae appears to be but one of the ecological factors in the development of dieback and branch cankers we observed in Douglas-fir. The trees may have been predisposed to infection by some climatic factor, such as drought, (Palmer Index of -3.37 for Sept. 1980, -3.15 for Oct. 1980) that caused abnormal stress in these trees growing in shallow soils with low moisture-storage capacity. The Palmer Index (PI) is a systematic moisture accounting used to estimate Meteorological Drought. Negative PI's are expected to reflect drought stress in plants during dry periods. PI values of -3.00 to -3.99 indicate severe plant stress. Drought usually first damages the tops of trees and the distal end of branches. Tissues that are damaged are very susceptible to attack by weak pathogens such as Dermea sp. Thus, adverse climatic conditions such as drought, reduce the vigor of trees and predispose them to attack by this fungus. The combination of drought conditions and heavy brush cover subjected the trees to abnormal stress

DISCUSSION

Dermea canker of Douglas-fir will not cause complete destruction of the plantation. However, it can affect the management of the plantation by reducing the stocking to an unacceptable level. The dieback and branch canker disease caused by Dermea pseudotsugae is found on Douglas-fir trees that range in size from saplings to small sawtimber. The intensity of the disease seems to be cyclic with limb and tip dieback evident every two to three years (outbreaks reported in 1975, 1978, and 1981). The trees appear to resume normal growth in the interveneing years when the disease incidence is at a low level.

MANAGEMENT ALTERNATIVES

1. No Change in Present Management. Every two to three years D. pseudotsugae will cause limb and tip dieback in 10-50% of the trees. This may cause the plantation to be understocked in the future because the plantation has already been thinned.

2. Promote Vigorous Growth. The presence of brush places added stress upon the trees in the plantation, especially when they are under moisture stress already. These trees would greatly benefit from brush control. The alternative would reduce competition for moisture, and allow the trees to resume more normal growth, and increase resistance to this disease.

3. Plant Resistant Species. This alternative offers a way to replant areas where Douglas-fir has already died from D. pseudotsugae. Ponderosa pine, which appear to be growing well in the area, could be planted.

4. Establish New Plantations. New plantations established in this area should not have major components of Douglas-fir on poor sites.

Alternative 2, 3, and 4 appear to be reasonable approaches given our limited knowledge of the long-term influence of D. pseudotsugae on Douglas-fir plantation and natural stands.